

Search for the standard model Higgs boson in $\ell\nu$ +jets final states in 9.7 fb^{-1} of $p\bar{p}$ collisions with the D0 detector

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(Dated: January 25, 2013)

SUPPLEMENTAL MATERIAL

In this document we provide supplemental figures and information for the search for the standard model Higgs boson in $\ell\nu$ +jets final states in 9.7 fb^{-1} of $p\bar{p}$ collisions with the D0 detector.

SAMPLE HIGH FINAL DISCRIMINANT OUTPUT EVENTS

This appendix describes in detail the Higgs boson candidates with the highest and second highest final discriminant output in two jet events with two tight b -tags. The highest multivariate discriminant output event in all two jet, two tight b -tags events occurred on February 4, 2005, as event 4475841 in run 203524. The second highest multivariate discriminant output event in all two jet, two tight b -tags events occurred on May 6, 2003, as event 3263264 in run 176607. The properties of each event are detailed in Table I.

TABLE I: Detailed event information for the Higgs boson candidate events with the highest and second highest final discriminant output in two jet events with two tight b -tags. The expected signal to background ratio ($S:B$) for events with the observed MVA output value or higher is shown for the specific combined lepton, jet multiplicity and b -tag category.

Run number	203524	176607
Event number	4475841	3263264
MVA output	0.80	0.79
Expected $S:B$ ratio	0.49	0.17
Lepton	e	μ
p_T (GeV)	86	53
E (GeV)	86	60
ϕ	-1.943	-2.905
η	0.095	0.500
Neutrino		
p_T (GeV)	86	90
ϕ	-1.529	2.862
Dijet mass (GeV)	112	110
p_T (GeV)	167	136
ϕ	1.413	-0.094
η	1.093	1.093
M_T^W	35.53	35.43
Leading jet		
p_T (GeV)	129	76
E (GeV)	255	82
ϕ	1.260	0.327
η	1.298	0.364
Second-leading jet		
p_T (GeV)	44	73
E (GeV)	45	169
ϕ	1.872	-0.533
η	0.060	1.473

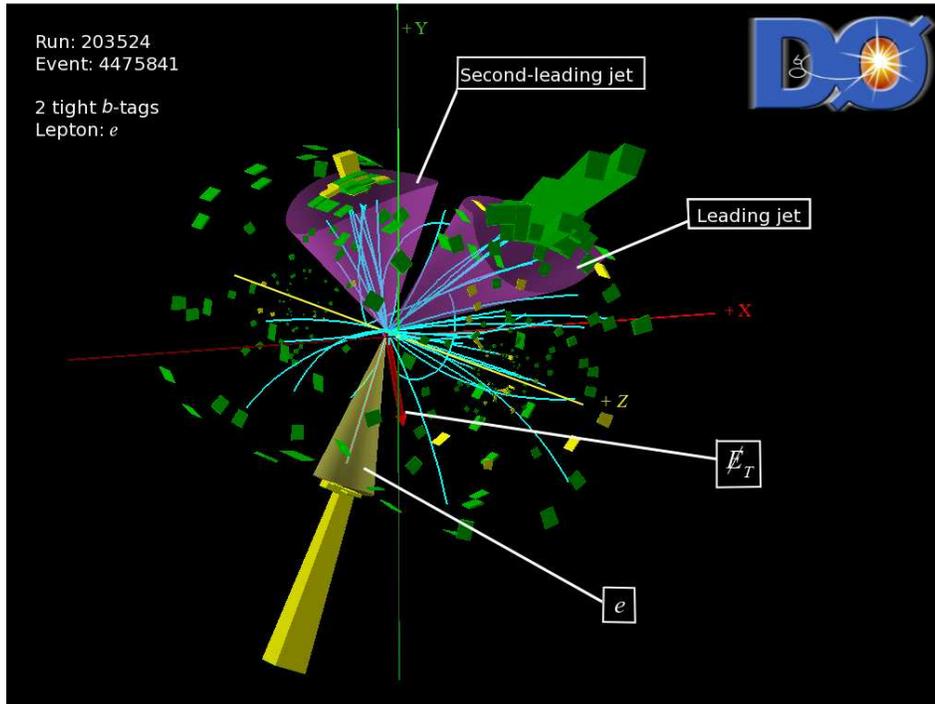


FIG. 1: (color online) Three dimensional event display for the highest final multivariate output event with two jets and two tight b -tags. Electromagnetic (hadronic) calorimeter energy deposits appear in yellow (green), charged particle tracks are shown in cyan, and the \cancel{E}_T vector appears in red. Only tracks with $p_T > 1.0$ GeV are shown.

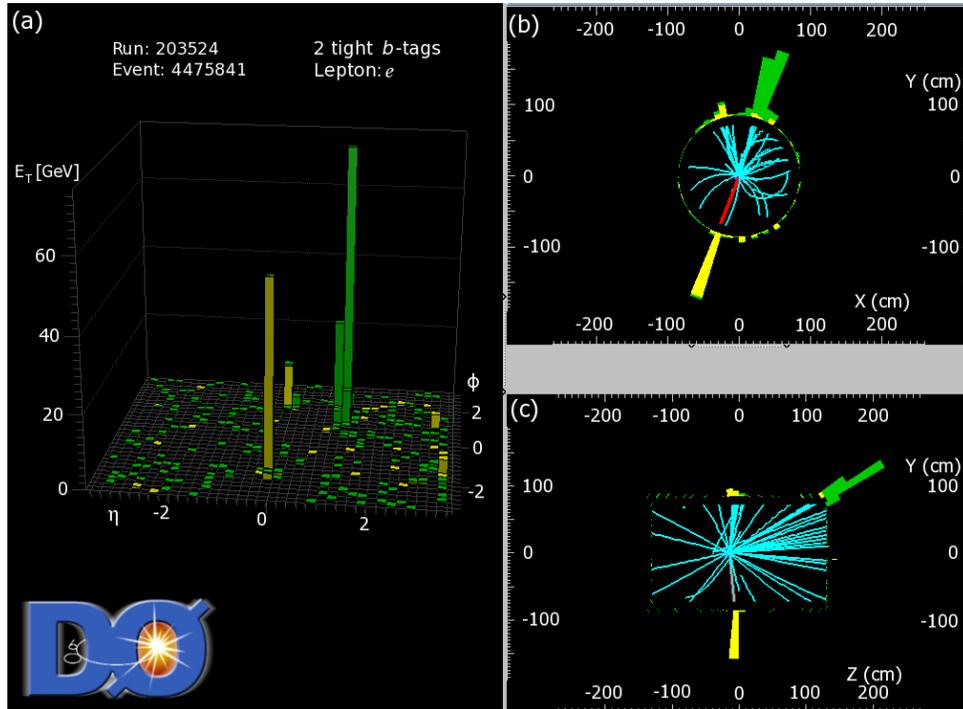


FIG. 2: (color online) Projected event displays, showing (a) calorimeter energy deposits in (η, ϕ) space and (b) calorimeter energy and reconstructed tracks in (x, y) space and (c) (z, y) space for the highest final multivariate output event with two jets and two tight b -tags. Electromagnetic (hadronic) calorimeter energy deposits appear in yellow (green) and charged particle tracks are shown in cyan. Only tracks with $p_T > 1.0$ GeV are shown.

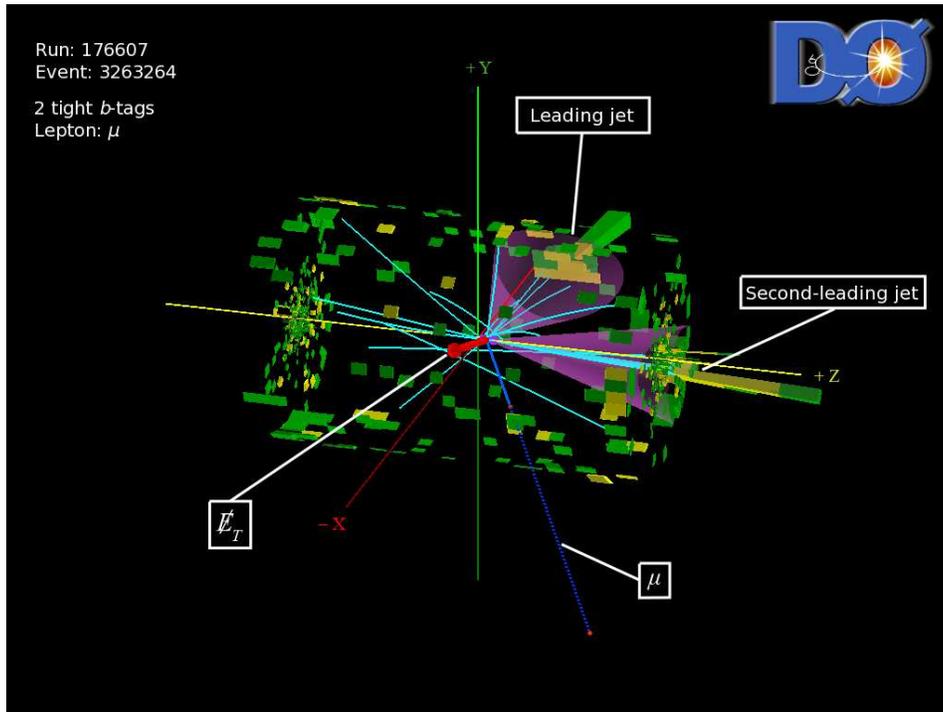


FIG. 3: (color online) Three dimensional event display for the second highest final multivariate output event with two jets and two tight b -tags. Electromagnetic (hadronic) calorimeter energy deposits appear in yellow (green), charged particle tracks are shown in cyan, the muon is flagged by a blue line, and the \cancel{E}_T vector appears in red. Only tracks with $p_T > 1.0$ GeV are shown.

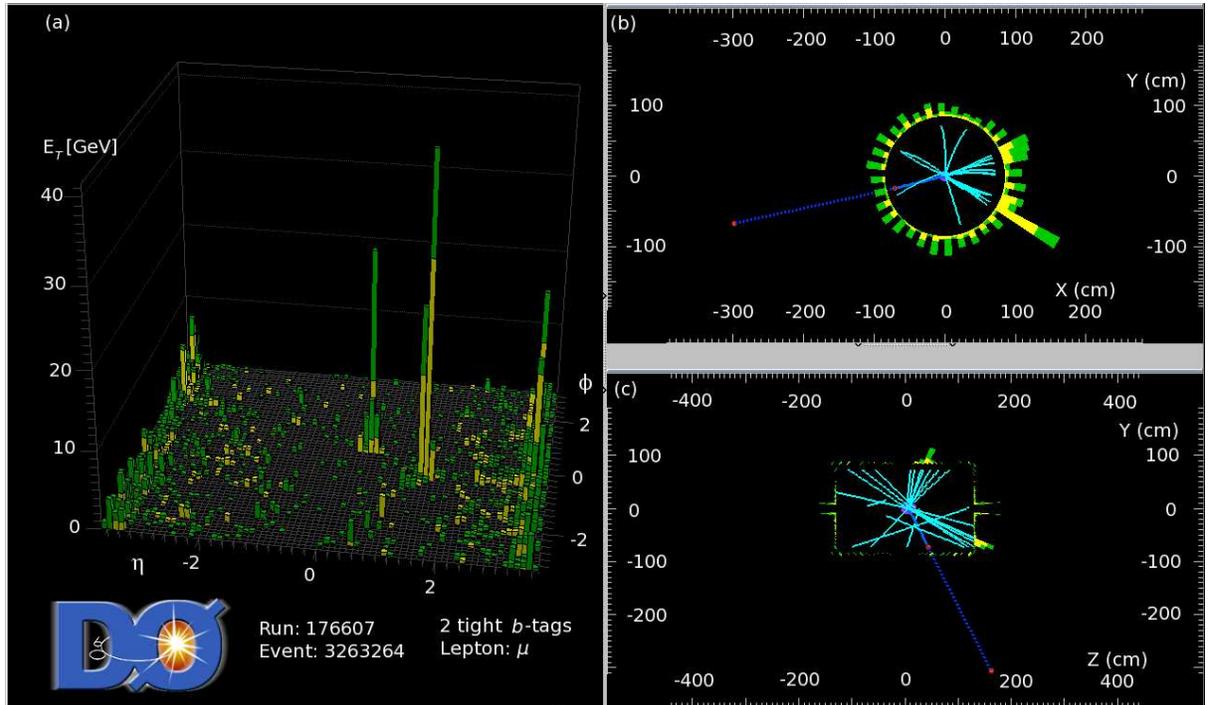


FIG. 4: (color online) Projected event displays, showing (a) calorimeter energy deposits in (η, ϕ) space and (b) calorimeter energy and reconstructed tracks in (x, y) space and (c) (z, y) space for the second highest final multivariate output event with two jets and two tight b -tag. Electromagnetic (hadronic) calorimeter energy deposits appear in yellow (green), charged particle tracks are shown in cyan, and the muon is flagged by a blue line. Only tracks with $p_T > 1.0$ GeV are shown.